Mobile User Plane Message Encoding

draft-murakami-dmm-user-plane-message-encoding-05

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-00 to -01

- Define the Arg.Mob.Upmsg to carry the sequence number for GTP-U message
- Add SID flavor consideration to consider PSP/USP case

-01 to -02

- Refer RFC8754 instead of draft-ietf-6man-segment-routing-header

-02 to -03

- Add security consideration

-03 to -04 and -04 to -05
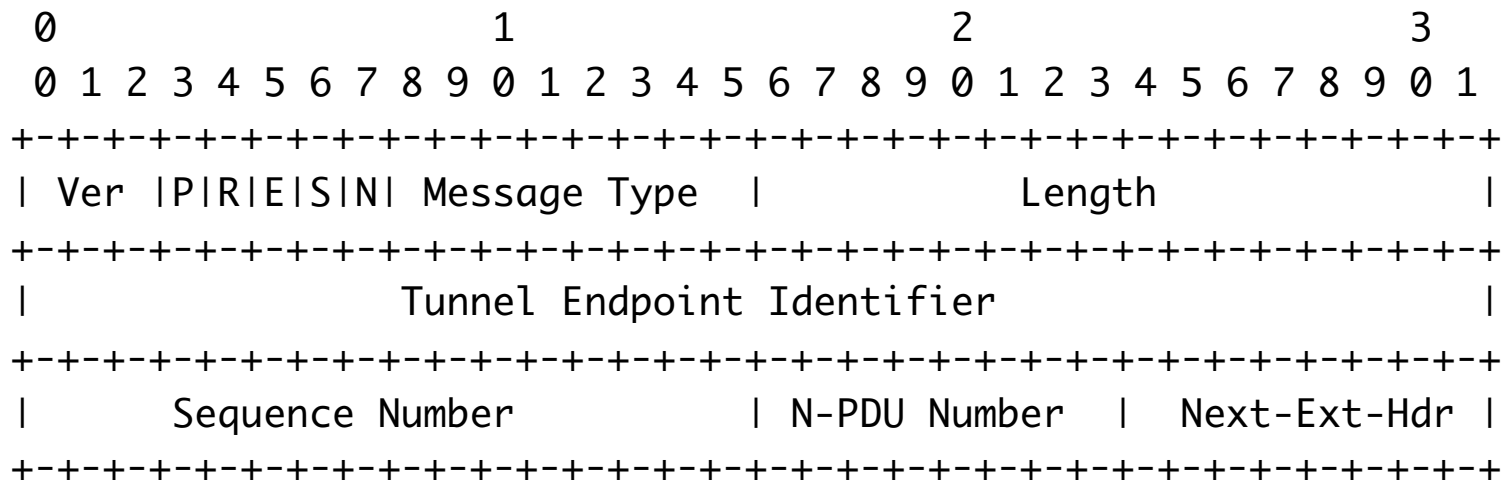
- Fix typo

Next Steps

- Comments?

- The document has been already stable.
- Calling for WG draft adoption

Backup

Motivation

- 3GPP User Plane needs to support the user plane messages associated with a GTP-U tunnel defined in [TS29281].

- In the case of SRv6 User Plane [I-D.ietf-dmm-srv6-mobile-uplane], those messages are also required when the user plane interworks with GTP-U.

- The Tag field of SRH is capable to indicate different properties within a SID. Also, SRH TLV is capable to provide meta-data to the endpoint node.

- The capability of SRH can be possible to map the user plane messages into SRH.

- There is no additional headers or extension headers to be chained in the packet for carrying the user plane messages.

GTP-U message format

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Ver |P|R|E|S|N| Message Type  |            Length             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Tunnel Endpoint Identifier                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        Sequence Number        | N-PDU Number  | Next-Ext-Hdr |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
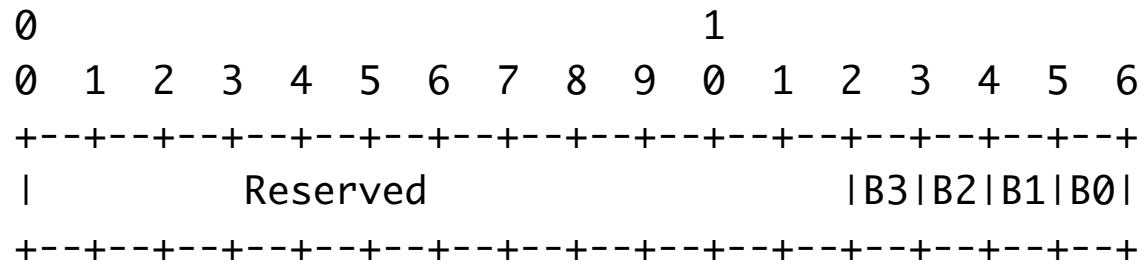
- Message Type for User Plane Message
  - Echo Request: 1
  - Echo Reply: 2
  - Error Indication: 26
  - End Marker: 254

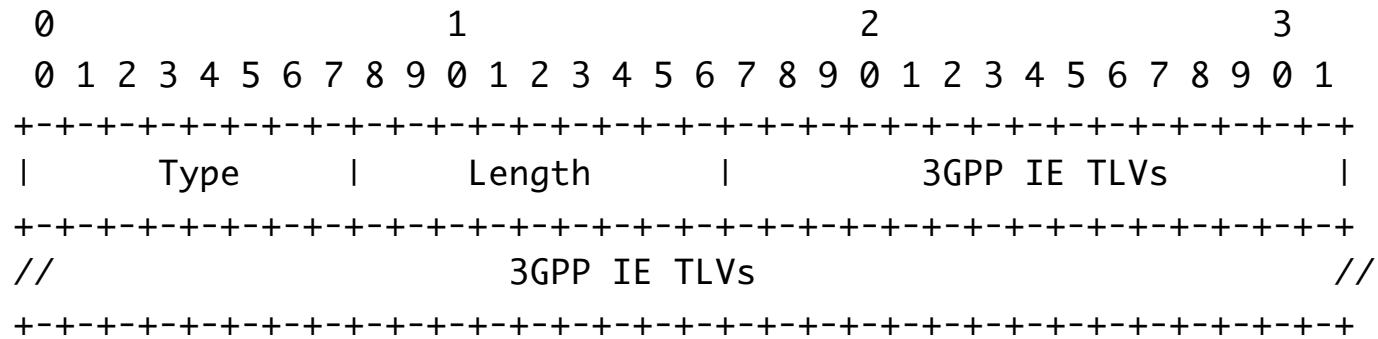# Segment Header

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Next Header   | Hdr Ext Len   | Routing Type  | Segments Left |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Last Entry    |     Flags     |         Tags Field            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|          Segment List[0] (128 bits IPv6 address)             |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|                                                               |
                              ...
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|          Segment List[n] (128 bits IPv6 address)             |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                                                             //
//         Optional Type Length Value objects (variable)      //
//                                                             //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Encoding of Tags Field

```
0                               1
0  1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|          Reserved                |B3|B2|B1|B0|
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
```
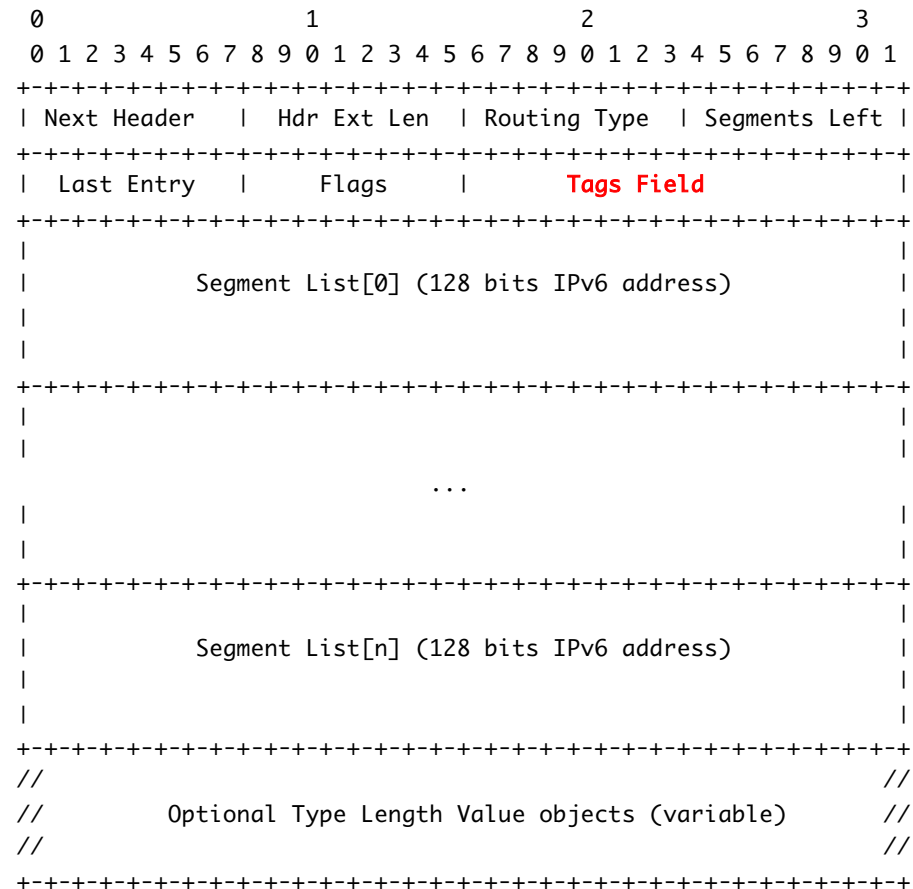
Bit 0 [B0]:   End Marker

Bit 1 [B1]:   Error Indication

Bit 2 [B2]:   Echo Request

Bit 3 [B3]:   Echo Reply

User Plane Information Element

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type       |     Length      |        3GPP IE TLVs       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                        3GPP IE TLVs                         //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                        5GS Container TLV
```

- SRH TLV should be leveraged to carry user plane information element.
- Type must be assigned by IANA

3GPP IE TLV
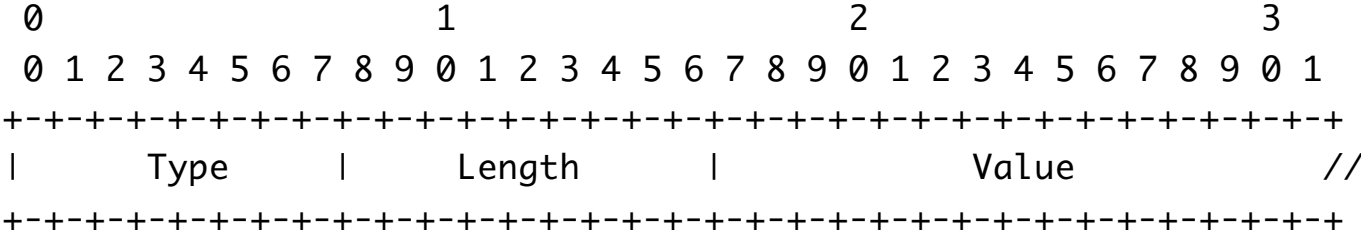
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type       |      Length     |           Value           //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                           3GPP IE TLV
```

- 3GPP IE is encoded in this TLV.
- 3GPP IE TLV should be followed with 3GPP specification.

PSP Case

- In order to carry User Plane message over SRv6 network, SRH must be sustained over entire SRv6 network because User Plane message type and required information elements are encoded into SRH.

- If the penultimate segment is popping out SRH, i.e., PSP, User Plane message can not be carried in entire SRv6 network.

- In order to avoid this problem…
    - PSP must NOT be used in SRv6 network or
    - Another SRH should be added to carry User Plane message along with the outer IPv6 or SRH if PSP is mandatory.

- Q&A